The Stock Preferences of Portuguese Mutual Fund Managers during Bull and Bear Market Periods

By

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Biographical note

Olayvanh Souphavongtay was born in 14 November 1987 in Savannakhet, Laos. He received his bachelor degree in Economics from Faculty of Economics and Management of National University of Laos in 2010. He then started to work in an investment banking company as a corporate advisory staff, where he developed professional background on financial market.

In 2012, he applied for Erasmus Mundus scholarship within the framework of MOVER project to pursue master degree in finance. He is currently studying in the Faculty of Economics of the University of Porto.

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Abstract

The role and influence of institutional investors have grown over time as more people participate in capital market through investment vehicles such as mutual funds. However, institutional investors are not all the same. They come in many different forms and with many different characteristics. Among other things, institutional investors have different organizational and governance structures, and are subject to different regulatory requirements.

Since there has been less attention paid to study stockholdings during bull and bear markets and these studies were mostly found only in US market, which has number of differences comparing to other markets, this dissertation will contribute to existing literature with new data set, the Portuguese market. This dissertation intends to investigate stock characteristics preferences of Portuguese mutual fund holdings during bull and bear market and whether differences in market conditions lead fund managers to hold stocks with different characteristics.

The results reveal similarities and differences between these two market trends. We found that fund managers prefer liquid and low volatility stocks in both bull and bear market. During bull markets, we find very weak evidence that funds managers make bet on stocks with high book-to-market ratio and purchase stock that have done well in the past. During in bear markets, fund managers significantly prefer stock with high book to market ratio. Weak evidence exists that mutual funds display preferences toward small firms stocks.

Key-words: Mutual funds, stock preferences, portfolio holding, bull and bear markets.

JEL Code: G02, G11

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1. Introduction

The mutual fund industry has increasingly played a dominant role in financial market over the last few decades. Mutual funds represent a large proportion of equity ownership. For example, institutional investors held discretionary control over more than half of the U.S equity market (Gompers and Metrick, 2001). Recent report made by Investment Company Institute (2012) shows that at year-end 2012 the U.S mutual funds market has $ 13 trillion (account for 49% in mutual funds asset worldwide) in asset under management. As the importance of mutual funds in stock market increase, understanding of factors that determine the demand for stock characteristics of fund manages is becoming the subject of discussion among academics.

The rationale behind managed funds is to add value by using management skills to generate great benefit to investors with limited knowledge, time or money. According to Pinnuck (2004) fund managers construct a portfolio base on three elements such as (1) stock characteristic preferences, (2) a fiduciary responsibility to investors and (3) private information known by fund managers. Our dissertation pays attention to mentioned elements of the decision-making process of constructing a portfolio of mutual fund managers.

Modern portfolio theory (MPT) is an important tool in the management of a portfolio of assets. It assumes that investors' decision-making process is based on the expected return of assets and the variance of asset returns. In order for MPT to function, it requires several underlying assumptions. One of the main assumptions is that there is no friction in the market (e.g. transaction costs, information asymmetries). However, in reality there are no truly frictionless markets since trading is always associated with certain costs or restraints, it becomes clear that some investors have comparative advantages that can be implemented to exploit these market frictions. So, when friction in capital market exists it implies that different groups of investors are expected to have different preferences toward stocks included in their portfolios.

In spite of the fact that many studies have been identified the relation between mutual funds holdings and stock characteristics, those studies have been conducted using U.S. institutional investors data that include insurance companies, banks, hedge funds, mutual funds in general market environment (e.g. Falkenstein, 1996, Del Guercio, 1996, Chen *et al.*, 2002, Gompers and Metrick, 2001, Chan *et al.*, 2002). Only few studies focuses only on mutual funds' preferences. It is surprising that empirical research studying investor behaviour in bull versus bear markets is rare.

Our study, in particular considers the case of investigating the preferences of mutual funds managers during different market conditions (bullish and bearish) using a Portuguese mutual funds data set. Motivations for this dissertation is that previously there has been less attention paid to study stock characteristic preferences in different market conditions as well as most study were took place mainly in U.S. market, and importantly there are number of differences between Portuguese market and U.S. market and these different may lead to show us different demands for stock characteristics between these two countries.

The purpose of this dissertation is to examine the portfolio preferences for stock characteristics of Portuguese mutual fund managers during bull and bear market with respect to stock size, return variance, book-to-market ratio, liquidity, number of months of stock since listing in the market, price level, momentum and PSI 20 index membership. We then compare these preferences and whether mutual fund managers prefer stock with different characteristic in bull and bear market. This study will extent the literature of investigating portfolio preferences for stock characteristic using the approach adopted by Badrinath *et al.* (1989), Falkenstein (1996), Del Guercio (1996), Covrig *et al.* (2006), Gompers and Metrick (2001) and Pinnuck (2004) who examine the portfolio preferences for stock characteristics. Accordingly, the key research questions of our study is to explore stock characteristic preferences of mutual fund managers during bull and bear markets periods and whether these differences in market trends lead to different preferences for stock characteristics.

Using a Portuguese mutual funds database, our major findings of this dissertation are summarized as follows. First, less volatile stocks are preferred by mutual funds in both bull

and bear market. This preference could be driven by prudent concerns of fund managers. Second, stocks with high liquidity tend to be included in funds portfolios across two market trends. According to conventional wisdom, a more liquid stock is adversely affected by an increase in its transaction costs. Fund managers prefer stock with high book to market ratio in bear market (that is value stocks). Once the market has not performed well, funds managers might see dividend as an important consideration. Further, weak and inconclusive evidence was found that fund managers buy stock with good past performance.

The remainder of this report is structured as follows. Section 2 reviews the literature and similar studies, and discusses the rationale behind portfolio formation of mutual funds. Section 3 addresses the methodology, namely the regression model and database used in this study. Section 4 presents empirical results on stock characteristics preferences, followed by discussion and interpretation in section 5. Section 6 concludes the dissertation.

2. Literature review

2.1 Main concept of portfolio formation

This section discusses the theoretical framework of the expected preferences for stock characteristics included in a mutual fund manager's portfolios considering the motives for portfolio formation of fund manager, which relate to investment performance and prudential requirements.

2.1.1 Investment performance

There are a number of factors affecting fund's investment performance. In order to make the stock-picking decision, fund managers consider various factors including transaction costs, information asymmetries and historical returns. These factors are discussed below.

a. Transaction costs

Transaction costs are potentially important cost to mutual funds. The existence of commission fee and taxes can negatively affect fund performance. There are ample references to trading costs and their likely effect on fund returns in the literature. Keim and Madhavan (1998) provide a review of trading costs literature that includes both explicit and implicit cost. Explicit costs are the direct costs of trading, such as broker commissions and taxes. However, such costs paid by institutional investors have declined over time (Stoll, 1995), the decline may be explained by the increasing institutional presence in the market, which may have produced a more competitive environment for trading services, one in which institutions commonly negotiate lower commission rates. The decline in commission costs is also related to technological innovations in trading, for example, the increased use of low-cost electronic crossing networks by institutional traders. As implicit costs including the bid-ask spreads, price impacts, and opportunity costs are much more difficult to measure than explicit costs. The quoted bid-ask spread is considered the market maker's compensation for providing liquidity which is related to the stock's liquidity, stock's price per share or market capitalization.

Barclay *et al.* (1998) use an event-study approach to estimate the sensitivity of price and volume to changes in transaction costs. They find that higher bid-ask spreads significantly reduce trading volume. Amihud and Mendelson (1986a, 1986b) find that expected returns are highly sensitive to changes in transaction costs. Brennan *et al.* (1998) use trading volume as a proxy for transaction costs and also find significant evidence of a liquidity premium.

Chalmers *et al.* (1999) suggest that trading costs are negatively related to fund returns which extend the conclusions drawn in indirect analyses of the relation between fund trading costs and fund returns (e.g. Grinblatt and Titman, 1989, Elton *et al.*, 1993, Carhart, 1997 and Edelen, 1999). Additionally, they find no evidence that on average trading costs are recovered in higher gross fund returns. Further evidence on diseconomies is provided by Edelen *et al.* (2007) who directly estimate trade costs (commissions, spreads and price impact), which adversely affect performance.

There seems to be a general agreement that higher transaction costs lead to higher expected returns and lower trading volume. In order to maximize investment performance, fund managers should invest in stocks with lower transaction cost, as they are more sensitive to the transaction cost incurred by large-percentage bid-ask spreads for illiquid or low-priced stocks. Given the relationship between stock liquidity and transaction costs, fund managers are expected to demand liquid stocks (high firm size, high price per share, high share turnover) as a way to avoid high transaction costs.

b. Information asymmetry

Under the market efficiency hypothesis, our financial markets are informationally efficient. However, the market may not be fully efficient when publicly available information is costly to produce and when investors can always purchase better information at a higher price. In order to make stock picking decisions designed to strengthen investment performance, fund managers allocate resources to obtain costly information needed while minimize information search cost at the same time.

It has been suggested that information proxies are significantly positively correlated with

mutual funds ownership. Falkenstein (1996) investigates U.S. mutual fund equity holding. The results reveal that funds tend to avoid stocks with little information, and exhibit a preference towards stocks that are discussed in newspapers and also stocks that have been listed on the exchange for a significant period of time. This may be explained by the fact that firms with low profiles are likely to require greater information search costs in highlighting them as securities desirable within a portfolio. Also, these firms may have greater uncertainty in the estimation of their risk. This is similar to the finding of Grossman and Stigliz (1980) who suggest that informed investors trade only to the extent that the expected value of their private information is greater than the costs incurred to gather the information and implement the trades.

Kang and Stulz (1997) also examine the issue of information asymmetries by sorting portfolio holding by either domestic or foreign fund managers in Japan. They find that foreign investment holding in Japan are biased toward large firms, among other variables. The overall evidence is consistent with the conjecture that foreigners invest in firms about which they are better informed. Thus, it can be argued that the home bias is driven by informational asymmetries. This evidence is consistent with model of Merton (1987), in which investors do not have equal information and rational investors prefer stocks which they are better informed or such stocks are generally internationally known, or have greater visibility in the global markets. Dahlquist and Robertsson (2001) employ a Swedish firms sample and find similar results.

c. Historical returns

The bulk of evidence reports an association between portfolio holdings of institutional investors and past stock performance and profitability of momentum strategies. Jegadeesh and Titman (1993) document that strategies which buy stocks that have performed well in the past and sell stocks that have performed poorly in the past generate significant positive returns over 3-12 months holding periods after controlling for size and risk. Rouwenhorst (1998) shows similar evidence for 12 European countries.

Using stocks listed in New York Stock Exchange (NYSE), American Stock Exchange

(AMEX) and National Association of Securities Dealers Automated Quotations (NASDAQ), Chan *et al.* (1996) report that drifts in future returns over the next six and twelve months are predictable from a stock's prior return. This evidence is partly explained by the delayed in price reaction to firm-specific information, such as earning announcements. Grinblatt *et al.* (1995) use quarterly data from 155 mutual funds over 1975-1984 and show that mutual funds with prior superior quarterly returns tend to outperform in the following quarters. They find that the momentum strategy, especially buying past winners, is more effective than the contrarian strategy in the U.S. market.

Nofsinger and Sias (1999) reveal a strong positive relation between subsequent returns and subsequent changes in institutional ownership for both past "losers" and "winners" in U.S. market. The subsequent change in institutional ownership is strongly related to the degree of return momentum. There are two possible reasons for this relation, it is either institutional investors rebalance their portfolios as a result of the subsequent momentum (institutional investors may buy past winners, but only keep those that subsequently perform well) or subsequent performance may be determined by the degree that institutional investors herd to (or away from) these stocks.

Further evidence on this issue is provided by Badrinath and Wahal (2002) who also document that institutional investors adjust their portfolios based on past stock return performance. Interestingly, they find that institutional investors act like momentum traders when they purchase but trade like contrarians when they dispose of their holding positions, indicating that institutional investors tend to purchase past winners and simultaneously sell overperforming stocks.

Another contribution is provided by Grinblatt and Keloharju (2001) who use data from Finland to analyze the investment behavior of investors. They find that foreign investors tend to follow momentum strategies, buying past winning stocks and selling past losers. Additionally, the portfolios of foreign investors seem to outperform the portfolios of households.

d. Book-to-market equity

Value investing has been proven to be a successful investment strategy. There are several ways to evaluate its success. One way is to examine the performance of simple value strategies, such as buying stocks with low price-to-earnings, price-to-cash-flow, or book-to-market ratios. Numerous academics have published studies investigating the effects of buying value stocks. Lakonishok *et al.* (1994) document that institutional investors seem to prefer growth stock or glamour stock that have low book-to-market ratios. They hypothesize that previous success of the stocks helps institutions justify their portfolios to investors, and also that trend following may bias institutions toward these stocks. In contrast, there are some studies that have consistently found that value stock outperform growth stock and market as a whole. Gompers and Metrick (2001) find supporting evidence for this amongst U.S. institutional investors. Chan *et al.* (2002) find evidence of U.S. mutual funds exhibiting preferences for growth stocks. Halliwell *et al.* (1999) document superior one-year-ahead performance for value stocks.

2.1.2 Prudential constrains

Mutual funds act as agents having responsibility for managing investors' money and making decisions on behalf of their investors. The financial agent generates income by acting to assist the client and represents the interests of the clients. Del Guercio (1996) examines the effect of prudent-man laws on the behavior of U.S. institutional investors. She finds a tendency for institutional investors to move their portfolios toward higher quality or safer stocks. These results support earlier finding of Badrinath *et al.* (1989) who also analyze investment behavior of institutional portfolio managers within the context of their fiduciary responsibility arising from handing clients capital. Considering these findings, it is expected that constrained fund managers may show an aversion to invest in stocks that are considered to have higher risk. Level of institutional ownership in stocks in Australia is negatively correlated with stock return volatility as revealed by Pinnuck (2004). However, this result is not conclusive, there are other studies indicating the contrary results.

Falkenstein (1996) examines preferences of U.S. mutual funds for various stock

characteristics. Using portfolio stockholding data for the year 1991 and 1992 to determine percentage of ownership of mutual funds for NYSE and AMEX listed stocks. He finds that mutual fund managers prefer high volatility stocks which is attributed to the consequence of agency problem existing between fund managers and their clients. One of a fund manager's biggest risk is career risk, the risk that fund manager substantially underperforms compared to the fund's benchmarks or to other funds that are classified as peers. Given a mutual fund manager making decisions on behalf of his or her fund's investors, fund managers should attempt to maximize portfolio expected return for a given amount of portfolio risk, or equivalently minimize risk for a given level of expected return. Therefore, fund managers are expected to consider a defendable investment decision in the instance of extreme poor performance.

More recent studies by Bennett *et al.* (2003) show that institutional investors' preferences for safe stocks have declined over time in favor of riskier securities. To sum up, there appears to have different conclusion regarding preferences of institutional investors in term of stock volatility, however the existing empirical evidence suggests that institutional investors should prefer lower volatility stocks.

2.2 Phases of bull and bear market

There is no generally accepted formal definition of bull and bear markets in the finance literature. The bull and bear market terminology is widely used by financial analysts to characterize the evolution in stock prices. There has been substantial divergence in the literature in the definition of bull and bear markets used in this context. Some early studies compare the market index to a critical threshold value to differentiate upward from downward market months, an alternative defines markets as being either bull or bear using a trend based approach to analyze stock market conditions. The upward and downward market scheme divide the market into bull and bear market periods by comparing the market index to a critical threshold value. For example, Wiggins (1992) defines up (down) months as months when the (excess) market return is greater (less) than zero. Bhardwaj and Brooks (1993) use median market return as the demarcating value to separate bull from bear months. Each month in their study is classified as either a bull month or a bear month

if the market return in that month is higher or lower than the median market return over the entire sample. Fabozzi and Francis (1977) define substantial up (down) months as months in which the return on the market portfolio was greater (less) than 1.5 times its standard deviation. They separate the market into periods when the market was substantially up or down. Dukes *et al.* (1987) use the Dow-Jones and S&P500 Index to define bull (bear) markets as periods in which the index increased (decreased) by at least 20% from a trough (peak) to a peak (trough), to analyze the stability of the market model parameters. Pagan and Sossounov (2003) and Lunde and Timmermann (2004), who each develop sophisticated trend-based definitions of bull and bear markets that focus on systematic movements in the market. Both papers define bull and bear markets in terms of movements between peaks and troughs, and use pattern recognition dating algorithms to classify bull and bear markets.

Croci *et al.* (2010) examine acquisitions made in high and low market valuation periods, they classify each calendar month into high-, neutral-, or low valuation month on the basis of the detrended market price to earnings (P/E) ratio of the value-weighted market index. The market P/E ratio is detrended by removing the best straight line fit (OLS) from the P/E ratio of the month in question and the five preceding years.

3. Empirical study

3.1 Construction of database

The data for this study come from two sources. Mutual funds ownership monthly data for each stock and historical PSI 20 membership data are sourced from Comissão do Mercado de Valores Mobiliários Website (CMVM) from the period of May 2004 to December 2012. The information on stock characteristics including stock price, market capitalization, trading volume, age, and other data permitting measurement of the variables considered in the analysis of stock preferences of mutual funds, are obtained from Thomson Reuter Datastream.

Given that there are several types of investment funds. Our dissertation focuses only on mutual funds that mainly invest in equity that meet the condition of CMVM Regulation No. 15/2003 Collective Investment Undertakings:

1. Having at least 2/3 of their net asset value directly or indirectly invested in shares, or
2. The names of equity funds must contain the word “acções” (shares).

In addition to the criteria mentioned above, only stocks listed in Portuguese Stock Market included in mutual funds portfolio are considered.

The initial sample consists of 54 mutual funds holding 59 different stocks between May 2004 and December 2012 (a total of 104 months data). We then recognize the problem of data availability of stock characteristics of some stock in some calendar months we decide to exclude these stocks and include only 45 stocks with all variables. The mutual funds ownership data is defined as the number of shares held by mutual funds. For any particular firm, the fraction of outstanding share is simply the sum of fractional ownership of all mutual funds holding that stock. Table 1 reports cross-sectional mean, median, maximum and minimum of mutual funds ownership fraction. Each column presents a summary in a different market trend. We have 7, 9 and 11 stocks reported to have zero mutual funds holding in bull and bear markets, respectively. Mutual funds ownership fraction is used as

dependent variable in the censored regressions. Over May 2004 to December 2012 the whole sample period, mutual funds held, on average 2.30% of each firm's share outstanding. The ownership fraction ranges from a minimum of 0% to a maximum of 23.59%.

Table 1: Summary statistics on mutual funds stockholdings

	Whole sample	Bull market period	Bear market period
Total Observation	45	41	44
Number of stocks with $Own = 0$	11	7	9
Mean Own	2.30%	1.88%	2.56%
Median Own	0.72%	0.64%	0.49%
Max Own	23.59%	13.57%	23.59%

Note: Own denotes stock ownership fraction. The methodology used in classifying bull and bear market periods is presented in Section 4.1.

Our analysis focuses on eight stock characteristics: stock price, market capitalization, age, book to market equity ratio, momentum, liquidity, PSI20 Index Membership (dummy variable), return variance. These characteristics are similar to those used in previous literature (Falkenstein, 1996, Gompers and Metrick, 2001, Del Guercio, 1996, Pinnuck, 2004). Table 2 reports mean, median, minimum, and maximum of cross-sectional stock characteristics. For ease of interpretation, summary statistics presented in Table 2 are based on raw values, for example, the stock price and some other stock characteristics will be transformed using natural logarithm. Price represents price per share of stock given as the month-end price. BTM is book to market equity ratio computed as book value per share divided by market per share. Age is the number of months since the stock has been listed prior to the observation months. Size represents market capitalization of the stock. Liquidity is defined the percentage of monthly trading volume divided by shares outstanding. Momentum is 3 months returns. Return variance is variance of monthly returns for period up to 5 years prior (depending on data availability of each stock).

Panel A and Panel B in table 2 illustrate some striking differences between bull and bear

market that reflect the market environment. First, there seems to be more liquidity in the bull market. By looking at the mean of liquidity we could argue that high volume of trading takes place in bull market relative to bear market. Second, the price characteristic also shows significant difference between those two market conditions. This could be when the market is performing well in during bull market there are always higher demand than supply for stocks as a consequence the price tend to increase.

Table 2: Descriptive statistics of stock characteristics used in censored regression[2]

	Price (€)	BTM	Age (Months)	Size (Million €)	Liquidity	Momentum	Return Variance
Panel A: Bull market data							
Mean	4.84	0.38	155.76	1,980	5.80%	0.020	0.032
Median	3.13	0.41	148	318	3.06%	0.004	0.009
Maximum	34.10	7.46	240	16,900	101.21%	0.87	0.740
Minimum	0.09	-6.18	0	1.68	0.004%	-0.45	0.002
Panel B: Bear market data							
Mean	2.62	1.03	178.37	1,080	2.54%	-0.028	0.029
Median	1.55	0.90	179.50	152	1.06%	-0.030	0.010
Maximum	17.00	13.58	296.00	12,900	186.44%	4.072	0.940
Minimum	0.02	-13.00	0	0.24	0	-0.640	0.003

Using monthly data from May 2004 to December 2012, each month is classified as bull (bear) if the detrended PSI All-shares Index of that month belongs to the top (bottom) half of detrended PSI All-share Index above (below) average. The remaining months are classified as neutral-market periods.

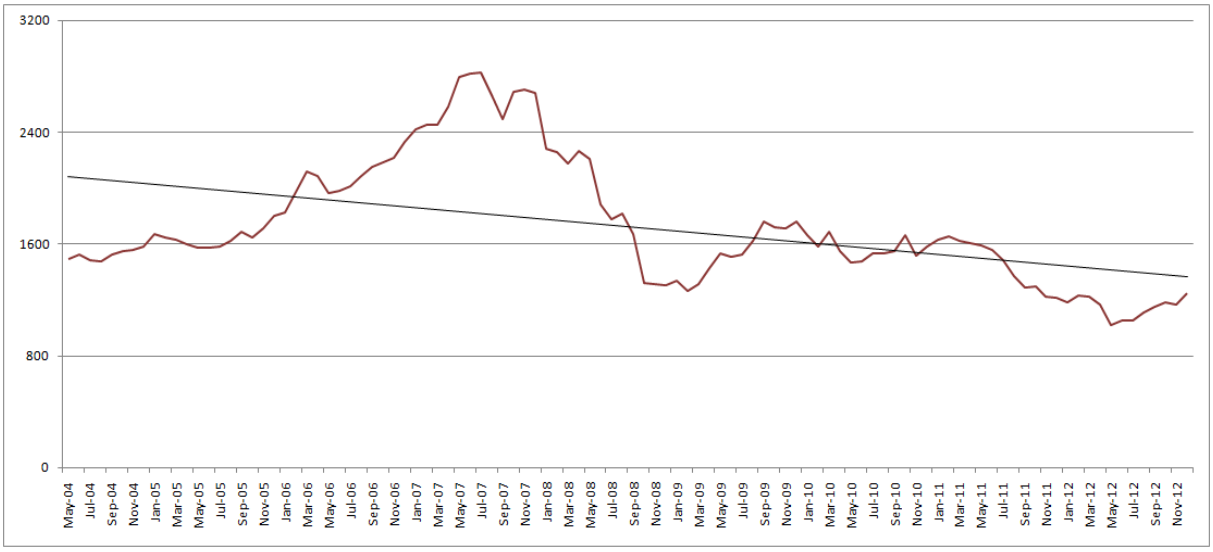
[2] The methodology used in classifying bull and bear market periods is presented in Section 4.1.

4. Methodology

4.1 Market trend classification technique

We are interested in examining the determinants of stockholding of mutual funds managers considered in bull and bear market. Therefore, how we distinguish the market trend is very important. We use monthly data of PSI All-shares Index starting from May 2004 to December 2012 (total of 104 months). Following the approach used by Croci *et al.* (2010), we classify each calendar months into high-, neutral, -low market trend on the basis of detrended PSI All-shares Index. PSI All-shares Index is detrended by removing the best straight-line fit (OLS) from the PSI All-shares Index period under study, we then classify each months into two groups: an above and a below average detrended PSI All-shares Index group. If the detrended PSI All-shares Index is above (below) average that month is categorized as above (below) group. We subsequently rank the detrended PSI All-shares Index in descending order. Finally, months that belong to the top half of above-average group are considered as bull market periods and months that belong to the bottom half of below-average group are considered as bear market periods. All other months are considered as neutral-market periods. Using this approach we conclude with 17 months of bull market, 34 months of bear market. The remaining 53 months are neutral-market periods. (since we are interested only bull and bear market periods, neutral-market periods are not considered in our dissertation).

Figure 1: PSI All-shares Index with its regression line



Source: Author's computations based on data gathered from Thomson Reuters Datastream

We use the following formula to obtain the detrended data

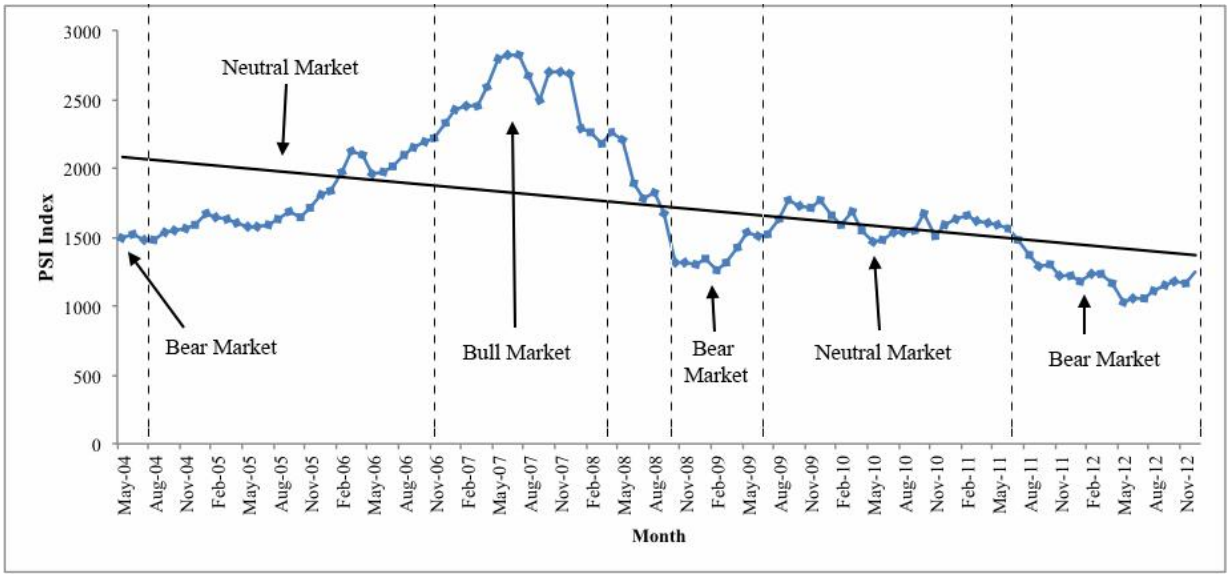
$$Detrended\ PSI\ All\ shares\ Index_t = PSI\ All\ shares\ Index_t - Trend_t \quad (1)$$

where $Trend_t$ is the equation from regression defined as

$$Trend_t = \beta_0 + \beta_1 X_t \quad (2)$$

In Figure 2, we show that over the whole sample period, the Portuguese stock market experienced upward and downward market trend. Specifically, the figure shows duration of the bull and bear market periods. The bull market period is basically above the trend line starting from late 2006 to beginning of 2008 in this period the market experienced an upward movement. On the other hand, from mid 2008 to beginning of 2009 and late 2001 to late 2012 the market show consistent drop which we consider as bear market periods. (see Appendix 1)

Figure 2: Bull and bear market periods



Source: Author's computations based on data gathered from Thomson Reuters Datastream

4.2 Estimation technique

This section sets out the empirical methodology to analyze the relation between stock characteristics and stockholdings of fund managers by using the same approach adopted by Falkenstein (1996), Gompers and Metrick (2001), Del Guercio (1996), Pinnuck (2004), Brands *et al.* (2006) who use stockholdings as an indicator of preferences for stock characteristics at an aggregate level, and stock characteristics are function of investment performance and prudential constrains, which are presented below:

$$\text{Stockholdings}_{i,t} = f\ (\text{Investment performance}_{i,t}, \text{Prudential constrains}_{i,t})$$

Where

$\text{Stockholdings}_{i,t}$ = the holding of stock *i* by fund manager at time *t*

$\text{Investment performance}_{i,t}$ = the stock characteristics of firm *i* associated with future stock performance

Prudential constrains$_{i,t}$ = the characteristics of firm *i* associated with prudent portfolio management

We estimate the following equation to examine the preferences of mutual funds in bull and bear market

$$Own_{i,t} = \beta_0 + \beta_1 Price_{i.t} + \beta_2 Size_{i,t} + \beta_3 Variance_{i,t} + \beta_4 Age_{i,t} + \beta_5 Momentum_{i,t} + \beta_6 Liquidity_{i,t} + \beta_7 BTM_{i,t} + \beta_8 Dum\_PSI20_{i,t} + \varepsilon_{i,t} \quad (3)$$

Where $Own_{i,t}$ is ownership fraction of stock *i* by all mutual funds at time *t*

$$\begin{aligned} \text{Own}_{\text{i,t}} &= 0 \quad \text{if Own}^{*}_{\text{i,t}} \leq 0 \\ \text{Own}_{\text{i,t}} &= 100 \quad \text{if Own}^{*}_{\text{i,t}} > 100 \end{aligned}$$

The model is left-censored at zero for a number of firms as there are no mutual funds holding in these firms and short selling is restricted in Portugal ($Own_i > 0$). And right-censored at 100% as it is the maximum possible stockholding of a particular stock. Therefore, the mutual funds stockholdings will be observed only from 0 – 100%.

4.3 Variables of the model

4.3.1 Dependent variable

The dependent variable in our study is the mutual funds ownership fraction for a particular stock. To compute this, we first summarize holding data sourced from CMVM and classify number of stocks and of shares held by mutual funds in the same month and we sum up the

number of holding of the same stock which are held by mutual funds. The holding fraction is expressed as a percentage of the total number of outstanding shares for a particular firm. Specifically, mutual funds ownership for a specific stock is defined as the following

Dependent Variable: ln(1+$Own_{i,t}$)

Where

$$Own_{i,t} = \sum_{m=1}^{M} \frac{number\ of\ shares\ owned\ of\ stock\ i\ by\ fund\ m\ at\ time\ t_m}{shares\ outstanding\ of\ stock\ i\ at\ time\ \ t_m} * 100$$

where t_m represents the date to which the portfolio data correspond for fund *m*'s holding of stock *i* and M is number of mutual funds.

4.3.2 Independent variables

As mentioned in previous section we consider eight independent variables in our analysis. Note that lagged values for all independent variables are used. For example, the first quarter of 2005 factors will be used to explain the holding of second quarter of 2005. This is to ensure that these factors are concerning investment decision of mutual funds managers. Details of each stock characteristic are provided below

a. Price: price per share of stock *i.*
b. Size: size represents the market capitalization of stock *i* at the month end.
c. Liquidity: liquidity of stock is measured by the monthly trading volume divided by share outstanding.
d. Age: number of months of stock *i* has been listed.

e. PSI 20 membership: a dummy variable equal to one if the stock is included in the PSI 20 in the period under study, zero otherwise.
f. 3-months momentum: past 3-three months gross return.
g. Book to market equity ratio: the ratio of the firm book value per share divided by market value per share.
h. Variance: the variance of monthly returns estimated using the previous three years of monthly returns (depending on availability which is up to 5 year monthly returns). It measures the total risk of a firm's stock.

To ensure consistency with the existing studies and in order to keep the extreme ownership observations from dominating regression parameter estimates and increase the robustness of the regression, some of variables are transformed as Log(1+variable) for Price, Liquidity, Variance and Log(variable) for Size, Age. For Momentum, Book-to-market ratio and PSI 20 dummy variable are not transformed.

4.3.3 Heteroskedasticity

Heteroskedasticity is more likely to take place on cross-sectional models. Similar studies also detect the issue of heteroskedasticity, which has serious consequences for the regression estimator. Although the regression estimator remains unbiased, the estimated standard error is wrong. Because of this, confidence intervals and hypotheses tests cannot be relied on. Given the nature of data used in our study we have a wide disparity between the largest and the smallest observed values. We may expect that the error term for very large observations might have a large variance, but the error term for small observations might have a small variance and heteroskedasticity can occurs with our data sets. To remedy for heteroskedasticity issue, our analysis use the Huber-White test to correct standard error and covariance.

5. Empirical results

The main objective of this study is to analyze the relations between mutual funds ownership fraction given as stockholdings divided by share outstanding and stock characteristics. To analyze the determinant of stock ownership in each market trend we use those characteristics mentioned in section 4 that are correspond to our bull and bear market periods. Specifically, we compare the results from bull and bear markets. Portuguese market has experienced such varying market trends during the sample period. With mutual funds data, we can examine the preferences of mutual funds and see how it relates to market conditions.

5.1 Bull market periods

We estimate 17 separate cross-sectional regressions – one for each month in the bull market[4]. Table 3 presents the results of the censored-regressions of bull market periods and the number of positive, negative and statistically significance. Our results show that stock price, market capitalization (size), age, book-to-market ratios and PSI 20 membership are not statistically significant across bull market months. With respect to liquidity, 15 out of 17 censored-regressions show that mutual fund holding is positively correlated to liquidity indicating that mutual fund managers demand for more liquid stocks. The coefficients on variance are negative and statistically significant at 5 percent level in 12 out of 17 periods of bull market. This result implies that mutual funds managers show an aversion toward volatile stocks.

The coefficients on momentum have a mix of signs for each regression, however there are only 5 out of 17 regressions showing that momentum is positively significant at 5 percent level to mutual funds holdings. This evidence suggests that momentum investment strategy in our sample exists.

[4] See Appendix 4

Table 3: Stock characteristics held by mutual funds in bull market (Censored regression model)

For each month classified as bull market we estimate the cross-sectional regression of stock ownership fraction held by mutual funds on eight stock characteristics under study. The table summarizes the results from 17 monthly Censored regressions for the sample period of bull market. The number of stocks in each cross-sectional regression ranges from 37 to 41. We estimate Censored regression (Tobit) left censored on 0 and right censored on 100. Huber-White standard error correction is used to remedy Heteroskedasticity issue (Huber, 1967 and White, 1980). Using monthly data from May 2004 to December 2012 each month is classified as bull, bear if the detrended PSI All-shares Index of that month belongs to top (bottom) half of above (below) detrended PSI All-shares Index average. All other months are classified as neutral market trend. Intercept value were omitted.

Variables	Average Coefficient	Number Positive (Significant)	Number Negative (Significant)
Log(1+PRICE)	0.193	16	1
		(0)*	(0)*
		(1)**	(0)**
Log(1+LIQUIDITY)	3.661	15	2
		(13)*	(0)*
		(13)**	(0)**
Log(1+VARIANCE)	-1.421	0	17
		(0)*	(12)*
		(0)**	(13)**
Log(SIZE)	-0.048	3	14
		(0)*	(0)*
		(0)**	(0)**
Log(AGE)	0.087	16	1
		(0)*	(0)*
		(0)**	(0)**
BTM	-0.065	1	16
		(0)*	(6)*
		(0)**	(6)**
MOMENTUM	0.303	8	9
		(5)*	(0)*
		(6)**	(0)**
PSI20_DUMMY	0.248	13	4
		(0)*	(0)*
		(0)**	(0)**

Number in parentheses indicates the number of significant coefficients.
*, ** Significant at 5% and 10% level, respectively.

5.2 Bear Market

We estimate 34 cross-sectional regressions, one for each month in the bear market periods[6]. Table 4 reports the summary of 34 censored-regressions. Stock price, size and book-to-market ratio are not statistically significant which are similar to the results of bull market counterpart. The coefficients on liquidity show both negative and positive sign. However, mutual funds preferences for stocks with less liquidity seem to be stronger than stock with high liquidity (10 of out 34 coefficients are negative statistically significant at 5 percent level, while there are only 1 positive coefficient which is significant at 5 percent level). Concerning variance, our estimated censored regressions indicate that coefficient on covariance are negative and significant in most months of bear market. This result confirms that both bull and bear market mutual funds avoid holding high risk stocks. The result for age characteristic implies that stocks being listed for a significant period of time on the market have been taken into consideration by mutual funds in 3 out of 33 periods of bear market. The evidence on momentum proxies is mixed, and most of coefficients are not statistically significant, therefore it is inclusive whether fund managers are momentum or contrarian investors. The PSI 20 dummy variable is not significant in almost all the bear market periods.

[6] See Appendix 5

Table 4: Stock characteristics held by mutual funds in bear market (Censored regression model)

For each month classified in bear market we estimate cross-sectional regression of ownership fraction held by mutual funds on eight stock characteristics under study. The table summarizes the results from 34 monthly Censored regressions for the sample period of bear market. The number of stocks in each cross-sectional regression ranges from 35 to 44. We estimate Censored regressions (Tobit) left censored on 0 and right censored on 100. Huber-White standard error correction is used to remedy Heteroskedasticity issue (Huber, 1967 and White, 1980). Using monthly data from May 2004 to December 2012 each month is classified as bull, bear if the detrended PSI All-shares Index of that month belongs to top (bottom) half of above (below) detrended PSI All-shares Index average. All other months are classified as neutral market trend. Intercepts were omitted.

Variables	Average Coefficient	Number Positive (Significant)	Number Negative (Significant)
Log(1+PRICE)	0.104	28	6
		(0)*	(0)*
		(0)**	(0)**
Log(1+LIQUIDITY)	-4.057	10	24
		(1)*	(10)*
		(2)**	(12)**
Log(1+VARIANCE)	-2.162	7	27
		(0)*	(11)*
		(1)**	(16)**
Log(SIZE)	0.088	29	5
		(0)*	(0)*
		(0)**	(0)**
Log(AGE)	0.256	33	1
		(3)*	(0)*
		(10)**	(0)**
BTM	-0.039	15	19
		(0)*	(0)*
		(0)**	(0)**
MOMENTUM	0.148	20	14
		(1)*	(2)*
		(1)**	(2)**
PSI20_DUMMY	-0.323	4	30
		(0)*	(1)*
		(0)**	(1)**

Number in parentheses indicates the number of significant coefficients.

*, ** Significant at 5% and 10% level, respectively.

5.3 Additional regression analysis after excluding stocks with zero ownership by mutual funds

To check whether our results from censored-regressions are driven by stocks with zero holding by mutual funds, we exclude these stocks from our sample and run simple OLS regressions – one regression for each month in bull market periods (total of 17 months)[7] and one regression for each month in bear market periods (total of 34 months)[8]. Comparing the results from Table 5 (OLS results) and the results from Table 3 (censored regressions results) suggest that no significant differences in preferences are found during bull market. However, there appear to be some striking differences in results during bear market. Table 6 reports that 10 coefficients on price are positively significant at 5 percent level (Price was previously not statistically significant in all censored regressions). Additionally, we find the coefficients on liquidity from Table 6 (OLS results) and Table 4 (Censored-regressions) are not consistent; we first obtained negative coefficients on liquidity from censored-regressions. However, after excluding stocks without any mutual fund holding we came to positive coefficients on liquidity. Therefore, we could argue that our results from censored-regressions are driven by stocks with zero mutual funds holdings. With regard to size variable, the average coefficients are negative and the majority of them are significant. Another difference we found is that book-to-market ratio coefficients are positive and highly significant in almost periods.

[7] See Appendix 6
[8] See Appendix 7

Table 5: Stock characteristics held by mutual funds in bull market (OLS Results)

This table gives the number of positive coefficients, number of negative coefficients, the number of significantly positive coefficients and the number of significantly negative coefficients. Significance of the monthly coefficients is computed using White-corrected standard errors (White, 1980). Each month classified in bull market we estimate cross-sectional regression of ownership fraction held by mutual funds on eight stock characteristics under study. The number of stocks in each cross-sectional regression ranges from 32 to 35. Using monthly data from May 2004 to December 2012 each month is classified as bull, bear if the detrended PSI All-shares Index of that month belongs to top (bottom) half of above (below) detrended PSI All-shares Index average. All other months are classified as neutral market trend. Intercepts were omitted.

Variables	Average Coefficient	Number Positive (Significant)	Number Negative (Significant)
Log(1+PRICE)	0.051	15	2
		(0)*	(0)*
		(0)**	(0)**
Log(1+LIQUIDITY)	1.584	12	5
		(8)*	(0)*
		(9)**	(0)**
Log(1+VARIANCE)	-1.436	0	17
		(0)*	(10)*
		(0)**	(11)**
Log(SIZE)	-0.130	1	16
		(0)*	(0)*
		(0)**	(2)**
Log(AGE)	-0.091	1	16
		(0)*	(0)*
		(1)**	(0)**
BTM	0.107	16	1
		(1)*	(0)*
		(2)**	(0)**
MOMENTUM	0.248	7	10
		(1)*	(0)*
		(0)**	(0)**
PSI20_DUMMY	0.175	13	4
		(0)*	(0)*
		(0)**	(0)**

Number in parentheses indicates the number of significant coefficients.
*, ** Significant at 5% and 10% level, respectively.

Table 6: Stock characteristics held by mutual funds in bear market (OLS Results)

This table gives the number of positive coefficients, number of negative coefficients, the number of significantly positive coefficients and the number of significantly negative coefficients. Significance of the monthly coefficients is computed using White-corrected standard errors (White, 1980). Each month classified in bear market we estimate cross-sectional regression of ownership fraction held by mutual funds on eight stock characteristics under study. The number of stocks in each cross-sectional regression ranges from 30 to 37. Using monthly data from May 2004 to December 2012 each month is classified as bull, bear if the detrended PSI All-shares Index of that month belongs to top (bottom) half of above (below) detrended PSI All-shares Index average. All other months are classified as neutral market trend. Intercepts were omitted.

Variables	Average Coefficient	Number Positive (Significant)	Number Negative (Significant)
Log(1+PRICE)	0.374	34	0
		(10)*	(0)*
		(11)**	(0)**
Log(1+LIQUIDITY)	1.833	20	14
		(2)*	(0)*
		(5)**	(0)**
Log(1+VARIANCE)	-3.725	0	34
		(0)*	(22)*
		(0)**	(23)**
Log(SIZE)	-0.173	1	33
		(0)*	(11)*
		(0)**	(15)**
Log(AGE)	-0.102	15	19
		(0)*	(1)*
		(0)**	(1)*
BTM	0.176	31	3
		(15)*	(0)*
		(18)**	(0)**
MOMENTUM	-0.066	19	15
		(1)*	(3)*
		(3)*	(5)**
PSI20_DUMMY	-0.312	9	25
		(0)*	(1)*
		(0)**	(4)**

Number in parentheses indicates the number of significant coefficients.
*, ** Significant at 5% and 10% level, respectively.

5.4 Discussion and interpretation of the results

5.2.1 Bull market

a. Transaction cost proxies

Previous studies provide evidence that low price stock is considered to have higher transaction cost, however during bull market periods our study result does not indicate that mutual fund managers prefer neither low or high price stock. Another coefficient of proxies for transaction cost in our study which is liquidity is positively correlated to mutual funds holdings; this suggests that mutual fund managers are sensitive to transaction costs as mutual funds stockholdings move the same direction with stock liquidity. This result is consistent with previous studies. Falkenstein (1996) and Brands *et al.* (2006) find that mutual funds prefer stocks with high trading volume. Gompers and Metrick (2001) and Pinnuck (2004) also find that institutional investor prefer stock with high liquidity.

b. Information proxies

Table 3 shows that proxies of information (Age and PSI 20 Dummy) are not statistically significant across the whole periods of bull market. Considering prudential motives, fund managers are expected to hold stocks with older age. For example, older stocks have a more reputation and the prevalence of information generated by these firms could allow fund managers to translate them into better investment decision. In addition, stocks which are membership of a particular index, the PSI 20 Index in our case, always have garnered attention and have greater visibility than other stocks in the market. Evidences provided by previous studies indicate that mutual fund avoid stocks with less information and prefer stocks that are discussed in newspaper (Falkenstein, 1996). Kang and Stulz (1997) also come with similar results. They find that foreign investors in Japan are more likely to know more about large firms which it is often argued that more information is available, and prefer them as securities in their portfolio.

c. Variance

The coefficients for variance are negative and mostly significant across the sample in bull market. This finding is inconsistent with the results of the work made by Falkenstein (1996) and Gompers and Metrick (2001). However, our result indicates that mutual fund managers prefer safer stocks and allocate their investment to less risky stocks. This might be explained by fund managers consider a defendable investment decision in case of extreme poor performance. Prudential constraints could be another explanation as mutual fund managers have a fiduciary responsibility to investors; risk control and compliance practices are likely to have implications for the fund performance. These constraints might drive portfolio management activities implemented by fund managers are managed in a prudent manner. Our result supports Del Guercio's finding (1996). Her results reveal that regulations distort the incentives of fund managers to act in the best interest of clients. Constrained managers might be discouraged from investing in high risk stocks but might improve the overall risk and returns within the portfolio.

d. Historical return

Our results provide weak evidence that funds managers prefer to hold stocks that are past winners. Under bearish market condition, stocks that have performed well in the past would be easier to justify and relatively more attractive, and seem to be a reasonable choice for fund managers to hold stocks with this characteristic in their portfolios. Some other studies provide mix of evidence. Grinblatt *et al.* (1995), Chan *et al.* (2002), Jegadeesh and Titman (1993, 2001) find that momentum exists among fund managers while Gomper and Metrick (2001) find the contrary result.

5.2.1 Bear market

a. Transaction cost proxies

Firstly, our result indicates that during bear market funds managers prefer illiquid stocks over liquid ones. Secondly, however, our further analyses have found that fund managers

have slight preferences for liquid and high price stocks relatively to illiquid and low price stocks. In a bear market, as more people are looking to sell than buy, the demand is likely to be weaker than the supply. Holding liquid stock seems reasonable. The existence of transaction costs clearly affects decision making of fund managers and diminish fund performance (Wermers, 2000). Furthermore, our analyses also reveal that fund managers relatively prefer small size stocks even though large stocks are considered to be good investment, more liquid (Falkenstein, 1996, Del Guercio, 1996, Gompers and Metrick, 2001), and more efficiently priced than small stocks (Freeman, 1987, Hong *et al.*, 2000) but as a result of that fund managers might have incentives to buy small stocks to take advantage of less efficient priced stocks. Additionally, small firm stocks have previously been documented to have abnormal high risk-adjusted returns for small firms[9] (Banz, 1981, Reinganam, 1981).

b. Variance

The bear market coefficients for variance are significant in most periods. Even though previous studies provide mix of evidences regarding return variance preferences, it is not surprising that fund managers in our sample prefer stocks with lower risk. Clearly the riskiest investment strategy would maximize the return however, given the prudential consideration, preference toward safer stock would seem rational as fund managers are concerned with potential loss within the portfolio. Besides, moving toward stocks would appear to be safer from standpoint of fund managers' career risk.

c. Information proxies

The result for age characteristic and PSI 20 index membership the two proxies for information indicate insignificance in almost period of bear market, concerning these two characteristics. Falkentein (1996), Gompers and Metrick (2001) find strong preferences over stocks with longer listing age on the stock market. They explain that old stocks have more established reputation, more news articles covered by analysts that would likely

[9] However, Stoll and Whaley (1983) examine abnormal returns on small stocks after transaction costs and find that it is not possible to earn abnormal risk-adjusted returns after accounting for transaction costs.

reduce information asymmetry and allow fund managers to justify easier, using the more information to valuate the stock would likely to reduce uncertainty about riskiness of the firm.

d. Book-to-market ratio

The results from censored regressions indicate that book-to-market ratio (BTM) is not significant throughout the whole periods of bear market. Nevertheless, we regress 34 periods of the bear market after eliminating stocks that have not been held by any mutual funds. We found that fund managers make significant bet on value stocks which usually offer high dividend yield and have strong financial position relatively growth stocks under bear market conditions, where the certainty, fear is high holding value stock could be safer investment.

e. Historical return

Even though most studies provides evidence that institutional investors including mutual funds tend to purchase stocks with a track record of good performance (e.g. Grinblatt *et al.* (1995), Chan *et al.* (2002), Jegadeesh and Titman (1993, 2001). The estimated coefficients on the momentum from our analysis show mix of sighs for each of the regressions and the coefficients are statistically significance on a few regressions suggesting mutual fund managers in our sample do not strongly follow momentum or contrarian strategy. Our results on momentum are partly consistent with evidence documented by Gompers and Metrick (2001) who study U.S. institutional investors and find that fund managers do not follow a momentum strategy but they employ contrarian investment instead. Pinnuck (2004) also reports that fund managers in Australia do not rely on buying stock with good past records.

6. Conclusion

This dissertation documents stock characteristics preferred by mutual funds during bull and bear market periods. We employ a database of monthly stockholdings of Portuguese mutual funds from May 2004 to December 2012.

The results reveal significant similarities and differences between bull and bear market periods. Our findings are as follow. First, during bull market no evidences are found that stock price, market capitalization, age of stock since listing on the exchange and PSI 20 index membership are significant characteristics in explaining mutual funds portfolio holdings. While stock return variance and liquidity are dominant explanatory factors. Fund managers exhibit preferences towards liquid over illiquid ones and are risk-averse investors. We find weak evidence that funds managers make significant bet on value stock and purchase stocks that have done well in the past.

The results for the bear market periods indicate that fund managers have slight preferences for liquid and high price stocks. Weak evidence suggests that fund managers prefer small market capitalization. With regard to return variance, we obtain the same result as in the bull market periods, mutual funds prefer safe stocks. Besides, the age of the stock since listing on the exchange and PSI 20 membership are found not significant in almost all estimations. Further, we found that fund managers tend to hold stock with high book-to-market ratios and they are either momentum or contrarian investors during the bear market periods.

To conclude, during both bull and bear market fund managers have the same preferences toward safe stocks. Possible explanation is that prudent management concerns lead to this preference, also fund managers are always evaluated and compensated on their investment performance which may lead to execute similar investment decision. Liquidity preferences are different between two market conditions. However, our further analysis indicates that funds managers exhibit slight preferences toward liquid stocks in both cases. This is consistent with transaction costs consideration. During bear market, fund managers prefer

stock with high book to market ratio (value stock). Given the nature of value stock, for example high dividend yield, once the market has not performed well in order to please the clients, funds managers might see dividend as an important consideration. Relevant to firm size, mutual funds display weak preferences toward small firms stocks. Since small firm stocks are known to be less efficient priced than large firms, fund managers might have incentives to small stocks to take advantage of less efficiency. With regard to momentum, mutual fund managers show weak evidence of buying stocks with good past returns and pursuing a contrarian investment strategy.

Due to the fact that we have small sample size, this might present limitation for mutual funds to form well-diversified portfolios and consequently might influence the robustness of the results. For further studies, it would be of interest and relevance to conduct studies with larger sample or studies of investment behavioral prospective during bull and bear market periods.

Appendix

Appendix 1: Market trend classification

This table shows how we categorized bull and bear market periods. The detrended index in third column is calculated as

$$Detrended\ data_t = PSI\ All\ shares\ Index_t - Trend_t$$

Where $Trend_t$ is the equation of regression defined as $Trend_t = \beta_0 + \beta_1 X_t$. Based on our data the trend equation we obtain is $Trend_t = 10739 - 0.2272X_t$

Note: for time series trends, we treats the dates as a function of observation number, so that here the first observation 31/05/2012 is 1; the second observation 29/06/2012 is 2 and so on.

Date	PSI All-shares Index	Detrended Index	Market Trend
31/07/07	2827.78	-7902.36	Bull market periods (Top-half of above average)
29/06/07	2817.62	-7912.75	
31/05/07	2795.73	-7934.86	
30/11/07	2704.44	-8024.79	
31/10/07	2692.34	-8037.12	
31/12/07	2681.63	-8047.37	
31/08/07	2664.83	-8065.08	
30/04/07	2585.39	-8145.43	
28/09/07	2497.02	-8232.66	
30/03/07	2452.8	-8278.25	
28/02/07	2450.61	-8280.67	
31/01/07	2418.25	-8313.25	
29/12/06	2331.56	-8400.17	
31/01/08	2283.17	-8445.61	
30/04/08	2264.3	-8463.79	
29/02/08	2255.22	-8473.33	
30/11/06	2219.23	-8512.73	
30/05/08	2206.69	-8521.18	Neutral-market periods
31/10/06	2185.91	-8546.27	
31/03/08	2176.18	-8552.14	
29/09/06	2150.03	-8582.38	
31/03/06	2123.36	-8610.41	
31/08/06	2090.65	-8641.99	
28/04/06	2090.56	-8642.99	
31/07/06	2016.5	-8716.37	

30/06/06	1978.8	-8754.29
28/02/06	1972.99	-8761.01
31/05/06	1961.12	-8772.20
30/06/08	1884.84	-8842.80
31/01/06	1829.87	-8904.36
29/08/08	1819.5	-8907.69
30/12/05	1803.92	-8930.54
31/07/08	1775.02	-8952.39
31/12/09	1761.82	-8961.73
30/09/09	1760.88	-8963.35
30/10/09	1721.14	-9002.86
30/11/09	1712.04	-9011.74
30/11/05	1710.31	-9024.37
31/03/10	1684.73	-9038.14
30/09/05	1684.72	-9050.42
31/01/05	1671.73	-9065.23
30/09/08	1669.73	-9057.23
29/10/10	1667	-9054.28
29/01/10	1661.26	-9062.06
28/02/11	1657.4	-9062.97
28/02/05	1649.87	-9086.86
31/10/05	1649.27	-9085.64
31/01/11	1630.1	-9090.50
31/03/05	1632.02	-9104.48
31/08/09	1625.45	-9099.01
31/03/11	1622.88	-9097.26
31/08/05	1625.01	-9110.35
29/04/11	1608.14	-9111.78
29/04/05	1600.05	-9136.22
31/05/11	1589.71	-9129.98
26/02/10	1584.57	-9138.53
31/12/10	1584.02	-9136.80
29/07/05	1585.92	-9149.67
31/12/04	1583.54	-9153.64
31/05/05	1574.66	-9161.39
30/06/05	1572.89	-9162.93
30/06/11	1560.87	-9158.59
30/11/04	1560.15	-9177.26
30/09/10	1551.86	-9169.65
30/04/10	1549.64	-9173.00
29/10/04	1547.65	-9189.99
31/08/10	1535.92	-9185.81

30/07/10	1534.8	-9187.16	
29/05/09	1532.68	-9192.46	
30/09/04	1528.55	-9209.31	
30/06/04	1525.77	-9212.78	
31/07/09	1523.14	-9201.55	
30/11/10	1513.96	-9207.09	
30/06/09	1506.67	-9218.24	
31/05/04	1495.47	-9243.30	
29/07/11	1485.52	-9233.71	
30/07/04	1482.63	-9255.69	
30/06/10	1476.42	-9245.77	
31/08/04	1476.57	-9261.52	
31/05/10	1467.8	-9254.61	
30/04/09	1430.34	-9295.03	
31/08/11	1369.01	-9350.00	
30/01/09	1339.55	-9386.50	
31/10/08	1317.85	-9408.88	
28/11/08	1315.3	-9411.20	
31/03/09	1309.61	-9415.99	
31/12/08	1306.46	-9419.82	Bear market periods (bottom-half of below average)
31/10/11	1299.8	-9418.75	
30/09/11	1289.41	-9429.37	
27/02/09	1261.69	-9464.13	
31/12/12	1249.19	-9466.18	
29/02/12	1233.74	-9483.90	
30/03/12	1226.85	-9490.57	
30/11/11	1221.51	-9496.81	
30/12/11	1214.87	-9503.23	
31/01/12	1185.31	-9532.56	
31/10/12	1181.95	-9533.88	
30/11/12	1167.18	-9548.42	
30/04/12	1165.61	-9551.58	
28/09/12	1153.89	-9562.16	
31/08/12	1106.12	-9610.16	
31/07/12	1051.89	-9664.62	
29/06/12	1049.47	-9667.26	
31/05/12	1023.58	-9693.38	

Appendix 2: The correlation coefficient of stock ownership fraction and stock characteristics in bull market periods.

	OWN	PRICE	LIQ	SIZE	AGE	BTM	VARIANCE	MOMENTUM	PSI20 DUMMY
OWN	1								
	-								
PRICE	-0.08	1							
	(-2.08)*	-							
LIQ	0.15	-0.15	1						
	(3.91)*	(-3.79)*	-						
SIZE	-0.23	0.08	0.19	1					
	(-5.91)*	(1.92)**	(4.97)*	-					
AGE	-0.16	-0.32	0.01	0.03	1				
	(-4.13)*	(-8.53)*	**(0.23)**	**(0.68)**	-				
BTM	-0.01	0.09	-0.07	-0.01	0.02	1			
	(-0.26)	(2.30)*	(-1.80)**	**(-0.20)**	**(0.61)**	-			
VARIANCE	-0.07	-0.04	0.21	-0.12	0.08	-0.06	1		
	(-1.82)**	**(-0.99)**	(5.27)*	(-3.02)*	(1.99)*	**(-1.43)**	-		
MOMENTUM	0.03	0.07	0.01	0.06	-0.07	0.09	0.05	1	
	(0.87)	(1.69)**	**(0.36)**	**(1.38)**	(-1.85)**	(2.14)*	**(1.33)**	-	
PSI20 DUMMY	0.09	0.04	0.27	0.54	-0.16	0.00	-0.11	0.14	1
	(2.16)*	**(1.11)**	(7.07)*	(16.00)*	(-3.97)*	**(0.08)**	(-2.77)*	(3.48)*	-

Using monthly data from May 2004 to December 2012 each month is classified as bull (bear) market period if the detrended PSI All-shares Index of that month belongs to top (bottom) half of above (below) detrended PSI All-shares Index average group. All remaining months are classified as neutral market trend. We estimate the correlations between stock characteristics in bull market periods that are used in the study. The t-statistics values are provided in parentheses. *, ** denote statistical significant at the 5, 10 percent levels, respectively. Bold fonts indicate non-statistical significance at both 5 and 10 percent levels. The methodology used in classifying bull and bear market periods is presented in Section 4.1.

Appendix 3: The correlation coefficient of stock ownership fraction and stock characteristics in bear market periods.

	OWN	PRICE	LIQ	SIZE	AGE	BTM	VARIANCE	MOMENTUM	PSI20 DUMMY
OWN	1								
	-								
PRICE	0.07	1							
	(2.61)*	-							
LIQ	-0.07	0.02	1						
	(-2.55)*	**(0.73)**	-						
SIZE	-0.21	0.42	0.17	1					
	(-7.90)*	(17.08)*	(6.23)*	-					
AGE	-0.06	-0.18	-0.06	-0.05	1				
	(-2.06)*	(-6.69)*	(-2.25)*	(-1.70)**	-				
BTM	0.05	-0.08	0.02	-0.07	0.12	1			
	(1.68)**	(-2.96)*	**(0.62)**	(-2.42)*	(4.39)*	-			
VARIANCE	-0.08	0.07	0.05	-0.10	0.07	-0.07	1		
	(-2.79)*	(2.62)*	(1.93)**	(-3.87)*	(2.46)*	(-2.41)*	-		
MOMENTUM	0.00	0.05	-0.09	0.03	0.08	-0.06	0.06	1	
	(-0.10)	(1.68)**	(-3.29)*	**(1.03)**	(2.83)*	(-2.03)*	(2.04)*	-	
PSI20 DUMMY	-0.19	0.15	0.22	0.54	-0.07	-0.01	-0.16	-0.01	1
	(-7.02)*	(5.62)*	(8.26)*	(23.66)*	(-2.41)*	**(-0.26)**	(-6.15)*	**(-0.30)**	-

Using monthly data from May 2004 to December 2012 each month is classified as bull (bear) market period if the detrended PSI All-shares Index of that month belongs to top (bottom) half of above (below) detrended PSI All-shares Index average group. All remaining months are classified as neutral market trend. We estimate the correlations between stock characteristics in bear market periods that are used in the study. The t-statistics values are provided in parentheses. *, ** denote statistical significant at the 5, 10 percent levels, respectively. Bold fonts indicate non-statistical significance at both 5 and 10 percent levels. The methodology used in classifying bull and bear market periods is presented in Section 4.1.

Appendix 4: Stock characteristics held by mutual funds in bull market periods.

This table shows 17 censored regression results, one for each month in bull market periods. We estimate censored regression to examine the relationship between stock ownership fraction and stock characteristics of interest. (left censored on 0 and right censored on 100). Huber-White standard error correction is used to remedy Heteroskedasticity (Huber, 1967; White, 1980). The dependent variable is ownership fraction of stocks. The independent variables are Price, Liquidity, Return variance, size, age, book-to-market ratio, momentum and PSI 20 dummy variable. z-Statistics are provided in parentheses. *, ** denote statistical significance at the 5, 10 percent level, respectively.

Variable	Regression 1		Regression 2		Regression 3		Regression 4		Regression 5	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	-1.552	(-0.772)	-1.594	(-0.806)	1.428	(0.859)	-1.660	(-0.754)	1.121	(0.507)
LOG(1+PRICE)	0.021	(0.076)	-0.075	(-0.292)	0.057	(0.227)	0.266	(1.047)	0.144	(0.507)
LOG(1+LIQUIDITY)	-1.422	(-0.38)	1.784	(0.585)*	3.221	(1.192)*	3.559	(3.052)*	4.734	(1.331)*
LOG(1+VARIANCE)	-0.056	(-0.067)	-0.492	(-0.623)*	-0.724	(-0.899)*	-2.151	(-1.661)**	-3.723	(-1.572)*
LOG(SIZE)	0.110	(0.872)	0.088	(0.746)	-0.069	(-0.665)	0.033	(0.313)	-0.060	(-0.584)
LOG(AGE)	0.001	(0.532)	0.131	(1.35)	0.000	(-0.082)	0.284	(1.194)	0.063	(0.26)
BTM	-0.059	(-0.716)	-0.050	(-0.231)	-0.033	(-0.412)	-0.158	(-1.576)*	-0.062	(-0.469)
MOMENTUM	-0.321	(-0.344)	1.345	(1.655)**	3.079	(3.529)*	0.875	(0.912)*	-0.104	(-0.094)
PSI20_DUMMY	-0.132	(-0.272)	-0.197	(-0.43)	0.200	(0.461)	-0.039	(-0.088)	0.386	(0.843)

Variable	Regression 6		Regression 7		Regression 8		Regression 9		Regression 10	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	0.688	(0.369)	0.466	(0.264)	-0.184	(-0.078)	1.148	(0.574)	1.293	(0.608)
LOG(1+PRICE)	0.493	(1.806)**	0.288	(0.979)	0.206	(0.695)	0.100	(0.369)	0.177	(0.647)
LOG(1+LIQUIDITY)	4.561	(3.839)*	11.132	(2.788)*	10.537	(1.967)*	1.184	(0.493)	-1.269	(-0.324)
LOG(1+VARIANCE)	-2.913	(-2.845)*	-2.082	(-2.397)*	-1.359	(-1.111)*	-1.204	(-1.215)*	-0.678	(-0.679)
LOG(SIZE)	-0.140	(-1.516)	-0.059	(-0.609)	-0.020	(-0.168)	-0.050	(-0.42)	-0.064	(-0.507)
LOG(AGE)	0.332	(1.345)	0.131	(0.573)	0.117	(0.456)	0.001	(0.519)	0.001	(0.511)
BTM	-0.177	(-2.154)*	-0.126	(-1.492)*	0.105	(0.591)	-0.109	(-1.23)*	-0.087	(-0.836)
MOMENTUM	2.346	(1.998)*	0.146	(0.154)	0.229	(0.183)	0.829	(0.533)*	-0.803	(-0.504)
PSI20_DUMMY	0.406	(1.022)	0.154	(0.377)	0.053	(0.11)	0.434	(0.816)	0.620	(1.067)

Appendix 4: Stock characteristics held by mutual funds in bull market periods (continued)

Variable	Regression 11		Regression 12		Regression 13		Regression 14		Regression 15	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	-0.222	(-0.101)	0.737	(0.298)	2.306	(0.987)	0.672	(0.301)	2.082	(0.906)
LOG(1+PRICE)	0.357	(1.357)	0.268	(1.139)	0.293	(1.203)	0.116	(0.494)	0.100	(0.416)
LOG(1+LIQUIDITY)	5.423	(4.216)*	2.666	(3.067)*	4.267	(1.554)*	2.586	(1.452)*	0.767	(0.24)
LOG(1+VARIANCE)	-0.564	(-1.281)*	-1.245	(-2.274)*	-2.318	(-2.243)*	-0.627	(-1.445)*	-0.447	(-0.522)
LOG(SIZE)	-0.037	(-0.296)	-0.042	(-0.302)	-0.145	(-1.15)	-0.047	(-0.381)	-0.100	(-0.785)
LOG(AGE)	0.136	(1.442)	0.032	(0.198)	0.082	(0.521)	0.093	(0.716)	0.009	(0.053)
BTM	0.000	(-0.001)	-0.083	(-0.953)*	-0.018	(-0.177)	-0.035	(-0.3)	-0.034	(-0.306)
MOMENTUM	-1.063	(-1.265)	-0.901	(-0.923)	-1.483	(-1.408)	-0.163	(-0.172)	-1.294	(-0.763)
PSI20_DUMMY	0.190	(0.351)	0.162	(0.287)	0.490	(0.924)	0.291	(0.541)	0.689	(1.303)

Variable	Regression 16		Regression 17	
	Coefficient	z-Statistic	Coefficient	z-Statistic
C	0.815	(0.345)	3.073	(1.308)
LOG(1+PRICE)	0.176	(0.762)	0.301	(1.216)
LOG(1+LIQUIDITY)	5.050	(2.578)*	3.455	(2.992)*
LOG(1+VARIANCE)	-2.597	(-2.996)*	-0.972	(-1.234)
LOG(SIZE)	-0.031	(-0.23)	-0.179	(-1.289)
LOG(AGE)	0.024	(0.207)	0.050	(0.341)
BTM	-0.117	(-1.028)*	-0.073	(-0.69)
MOMENTUM	2.668	(1.313)*	-0.241	(-0.525)
PSI20_DUMMY	-0.197	(-0.325)	0.703	(1.253)

Appendix 5: Stock characteristics held by mutual funds in bear market periods.

This table shows 34 censored regression results, one for each month in bear market periods. We estimate censored regression to examine the relationship between stock ownership fraction and stock characteristics of interest. (left censored on 0 and right censored on 100). Huber-White standard error correction is used to remedy Heteroskedasticity (Huber, 1967; White, 1980). The dependent variable is ownership fraction of stocks. The independent variables are Price, Liquidity, Return variance, size, age, book-to-market ratio, momentum and PSI 20 dummy variable. z-Statistics are provided in parentheses. *, ** denote statistical significance at the 5, 10 percent level, respectively.

Variable	Regression 1		Regression 2		Regression 3		Regression 4		Regression 5	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	0.025	(0.007)	-2.938	(-0.954)	-2.465	(-0.85)	-3.451	(-1.236)	-3.256	(-1.18)
LOG(1+PRICE)	0.167	(0.424)	0.007	(0.018)	0.164	(0.449)	0.136	(0.353)	0.128	(0.342)
LOG(1+LIQUIDITY)	-6.704	(-1.962)*	-6.781	(-1.146)	-14.271	(-2.926)*	-7.767	(-1.812)**	-2.345	(-1.163)
LOG(1+VARIANCE)	-4.557	(-1.846)**	-2.141	(-1.593)	-0.687	(-0.628)	-2.325	(-1.876)**	-2.532	(-2.216)*
LOG(SIZE)	0.152	(1.051)	0.087	(0.515)	0.053	(0.362)	0.122	(0.751)	0.097	(0.642)
LOG(AGE)	-0.418	(-0.74)	0.410	(1.749)**	0.364	(1.427)	0.376	(1.612)	0.427	(1.72)**
BTM	0.072	(0.977)	0.042	(0.557)	0.015	(0.182)	0.048	(0.769)	0.020	(0.367)
MOMENTUM	1.634	(1.46)	0.533	(0.444)	-2.578	(-2.101)*	-0.180	(-0.178)	0.695	(1.197)
PSI20_DUMMY	-0.550	(-0.987)	-0.028	(-0.049)	-0.064	(-0.122)	-0.289	(-0.594)	-0.314	(-0.613)
Variable	Regression 6		Regression 7		Regression 8		Regression 9		Regression 10	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	-1.196	(-0.57)	-3.054	(-1.171)	-3.747	(-1.227)	-0.566	(-0.298)	-4.420	(-1.723)**
LOG(1+PRICE)	-0.036	(-0.117)	0.181	(0.52)	-0.024	(-0.066)	0.235	(0.64)	0.196	(0.489)
LOG(1+LIQUIDITY)	5.541	(1.416)	-10.520	(-2.106)*	-10.945	(-1.982)*	8.957	(1.307)	-9.327	(-1.645)
LOG(1+VARIANCE)	-1.923	(-2.282)*	-0.992	(-0.818)	-2.205	(-1.551)	-2.509	(-2.728)*	-2.604	(-1.285)
LOG(SIZE)	0.109	(0.819)	0.138	(0.974)	0.140	(0.823)	0.041	(0.332)	0.207	(1.44)
LOG(AGE)	0.002	(1.436)	0.163	(0.625)	0.406	(1.751)**	0.002	(1.298)	0.263	(0.999)
BTM	-0.070	(-0.397)	-0.041	(-0.463)	0.022	(0.262)	-0.051	(-0.315)	0.045	(0.635)
MOMENTUM	1.786	(1.308)	-2.613	(-2.044)*	-0.160	(-0.115)	-0.215	(-0.185)	0.409	(0.42)
PSI20_DUMMY	-0.575	(-1.085)	-0.285	(-0.481)	-0.178	(-0.297)	-0.528	(-0.999)	-0.620	(-1.076)

Appendix 5: Stock characteristics held by mutual funds in bear market periods (continued)

Variable	Regression 11		Regression 12		Regression 13		Regression 14		Regression 15	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	-4.543	(-1.656)**	-3.869	(-1.527)	-3.377	(-1.336)	-1.887	(-0.78)	-3.742	(-1.354)
LOG(1+PRICE)	0.158	(0.43)	0.174	(0.424)	0.218	(0.524)	0.079	(0.238)	0.010	(0.025)
LOG(1+LIQUIDITY)	-16.093	(-2.442)*	-0.818	(-0.485)	-4.048	(-0.732)	-3.028	(-0.646)	-12.058	(-2.075)*
LOG(1+VARIANCE)	-1.103	(-0.953)	-1.810	(-1.386)	-7.382	(-2.351)*	-6.892	(-2.595)*	-1.756	(-1.26)
LOG(SIZE)	0.170	(1.159)	0.176	(1.279)	0.147	(1.065)	0.076	(0.58)	0.131	(0.829)
LOG(AGE)	0.455	(1.641)	0.278	(1.094)	0.296	(1.099)	0.221	(1.014)	0.416	(1.737)**
BTM	0.035	(0.692)	0.019	(0.392)	0.019	(0.352)	0.020	(0.42)	0.044	(0.794)
MOMENTUM	-1.177	(-1.202)	1.152	(1.568)	0.172	(0.159)	4.094	(2.389)*	-0.202	(-0.295)
PSI20_DUMMY	-0.460	(-0.906)	-0.675	(-1.353)	-0.615	(-1.125)	-0.201	(-0.449)	-0.193	(-0.352)

Variable	Regression 16		Regression 17		Regression 18		Regression 19		Regression 20	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	-1.156	(-0.606)	-3.803	(-1.21)	-2.022	(-0.92)	-4.140	(-1.554)	-2.172	(-0.789)
LOG(1+PRICE)	0.079	(0.253)	0.122	(0.383)	0.039	(0.13)	-0.168	(-0.441)	0.184	(0.461)
LOG(1+LIQUIDITY)	3.567	(0.989)	-6.020	(-0.629)	8.291	(0.923)	-1.532	(-0.247)	3.141	(0.415)
LOG(1+VARIANCE)	-2.068	(-2.257)*	-2.285	(-2.213)*	-2.356	(-2.923)*	-0.917	(-0.754)	0.080	(0.061)
LOG(SIZE)	0.076	(0.645)	0.088	(0.53)	0.070	(0.55)	0.187	(1.302)	0.013	(0.088)
LOG(AGE)	0.003	(1.855)**	0.536	(1.971)*	0.314	(2.181)*	0.392	(1.867)**	0.473	(2.05)*
BTM	-0.042	(-0.222)	-0.068	(-0.68)	-0.013	(-0.094)	-0.151	(-0.841)	-0.066	(-0.307)
MOMENTUM	0.906	(0.674)	-2.481	(-1.49)	1.136	(1.22)	1.895	(1.529)	-1.061	(-0.683)
PSI20_DUMMY	-0.688	(-1.097)	-0.304	(-0.519)	-0.616	(-1.115)	-0.815	(-1.342)	-0.152	(-0.27)

Appendix 5: Stock characteristics held by mutual funds in bear market periods (continued)

Variable	Regression 21		Regression 22		Regression 23		Regression 24		Regression 25	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	-6.096	(-1.656)**	-4.034	(-1.372)	-1.284	(-0.386)	-3.860	(-1.389)	-0.987	(-0.408)
LOG(1+PRICE)	0.046	(0.12)	0.009	(0.028)	0.102	(0.332)	0.268	(0.791)	0.273	(0.791)
LOG(1+LIQUIDITY)	-26.118	(-1.473)	4.679	(0.556)	2.686	(0.43)	5.982	(1.818)**	-0.902	(-0.232)
LOG(1+VARIANCE)	-0.309	(-0.24)	0.314	(0.302)	0.759	(0.68)	-0.483	(-0.45)	-3.252	(-2.625)*
LOG(SIZE)	0.203	(1.243)	0.170	(1.057)	-0.025	(-0.134)	0.160	(1.051)	0.012	(0.087)
LOG(AGE)	0.625	(2.066)*	0.368	(2.164)*	0.512	(2.583)*	0.317	(1.859)**	0.290	(1.169)
BTM	0.000	(0.002)	-0.006	(-0.043)	-0.101	(-0.551)	-0.171	(-1.041)	0.017	(0.513)
MOMENTUM	-1.084	(-0.758)	1.051	(1.089)	2.160	(1.183)	0.789	(0.978)	0.463	(0.727)
PSI20_DUMMY	-0.258	(-0.361)	-0.904	(-1.28)	-0.087	(-0.139)	-0.927	(-1.504)	-0.261	(-0.577)

Variable	Regression 26		Regression 27		Regression 28		Regression 29		Regression 30	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	-2.286	(-1.047)	-2.971	(-1.623)	-3.127	(-1.081)	-3.067	(-1.095)	-1.599	(-0.828)
LOG(1+PRICE)	0.031	(0.101)	0.157	(0.506)	0.246	(0.646)	0.273	(0.699)	0.256	(0.834)
LOG(1+LIQUIDITY)	-8.105	(-1.256)	7.592	(2.814)*	-5.993	(-1.058)	-10.184	(-1.556)	2.895	(0.528)
LOG(1+VARIANCE)	-1.777	(-1.903)**	-2.291	(-2.529)*	-8.590	(-1.91)**	-13.538	(-0.746)	-2.355	(-2.689)*
LOG(SIZE)	0.149	(1.148)	0.164	(1.478)	0.123	(0.786)	0.129	(0.88)	0.094	(0.794)
LOG(AGE)	0.003	(1.566)	0.004	(2.099)*	0.340	(1.323)	0.326	(1.243)	0.003	(1.402)
BTM	-0.145	(-0.64)	-0.209	(-0.874)	0.010	(0.215)	0.008	(0.127)	-0.175	(-0.684)
MOMENTUM	-1.128	(-1.253)	0.648	(1.116)	-0.109	(-0.127)	0.161	(0.412)	0.243	(0.326)
PSI20_DUMMY	-0.268	(-0.526)	-1.288	(-2.303)*	-0.615	(-1.166)	-0.594	(-1.104)	-0.569	(-0.934)

Appendix 5: Stock characteristics held by mutual funds in bear market periods (continued)

Variable	Regression 31		Regression 32		Regression 33		Regression 34	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	2.764	(0.957)	2.580	(0.784)	1.708	(0.669)	2.634	(0.873)
LOG(1+PRICE)	-0.048	(-0.15)	-0.053	(-0.156)	0.084	(0.227)	-0.156	(-0.364)
LOG(1+LIQUIDITY)	-9.151	(-2.492)*	-9.940	(-2.213)*	-4.309	(-2.624)*	-4.319	(-1.216)
LOG(1+VARIANCE)	1.865	(1.491)	0.734	(0.72)	2.078	(1.773)**	2.302	(1.103)
LOG(SIZE)	-0.114	(-0.747)	-0.107	(-0.707)	-0.125	(-0.933)	-0.111	(-0.768)
LOG(AGE)	0.071	(0.216)	0.096	(0.24)	0.309	(0.823)	0.067	(0.166)
BTM	-0.154	(-0.545)	-0.076	(-0.276)	-0.211	(-0.756)	-0.025	(-0.089)
MOMENTUM	0.496	(0.48)	0.199	(0.142)	-1.145	(-1.028)	-1.443	(-1.669)**
PSI20_DUMMY	0.751	(1.257)	0.717	(1.233)	0.754	(1.104)	0.714	(1.229)

Appendix 6: Ordinary least squares regression (OLS) results of stock characteristics held by mutual funds in bull market periods.

This table shows 17 OLS regression results, one for each month in bull market periods. We exclude stocks that are not held by any mutual funds and estimate OLS regression to examine the relationship between stock ownership fraction and stock characteristics of interest. Huber-White standard error correction is used to remedy Heteroskedasticity (Huber, 1967; White, 1980). The dependent variable is ownership fraction of stocks. The independent variables are Price, Liquidity, Return variance, size, age, book-to-market ratio, momentum and PSI 20 dummy variable. z-Statistics are provided in parentheses. *, ** denote statistical significance at the 5, 10 percent level, respectively.

Variable	Regression 1		Regression 2		Regression 3		Regression 4		Regression 5	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	3.825	(1.653)*	4.861	(2.096)*	4.120	(1.888)**	4.284	(2.497)*	3.960	(1.656)**
LOG(1+PRICE)	0.122	(0.446)	0.027	(0.092)	0.238	(0.785)	0.109	(0.398)	0.121	(0.383)
LOG(1+LIQUIDITY)	1.405	(0.97)*	1.444	(0.412)	2.574	(1.708)**	6.010	(1.482)*	6.090	(1.01)*
LOG(1+VARIANCE)	-1.808	(-1.482)*	-2.356	(-1.043)	-2.471	(-2.335)*	-1.856	(-2.191)*	-1.968	(-1.3)*
LOG(SIZE)	-0.103	(-0.898)	-0.147	(-1.385)	-0.169	(-1.723)**	-0.141	(-1.482)	-0.134	(-1.251)
LOG(AGE)	-0.227	(-0.991)	-0.252	(-1.043)	-0.103	(-0.376)	-0.206	(-0.896)	-0.181	(-0.641)
BTM	0.047	(0.466)	0.107	(0.883)	-0.003	(-0.026)	0.050	(0.597)	0.213	(1.279)
MOMENTUM	-0.442	(-0.539)	-0.054	(-0.057)	1.142	(0.969)	0.622	(0.485)	0.409	(0.272)
PSI20_DUMMY	0.005	(0.012)	0.269	(0.652)	0.254	(0.67)	0.122	(0.302)	0.091	(0.2)
Variable	Regression 6		Regression 7		Regression 8		Regression 9		Regression 10	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	3.061	(1.31)	3.317	(1.394)	4.404	(1.814)	4.486	(1.818)**	3.993	(1.71)**
LOG(1+PRICE)	0.187	(0.733)	0.152	(0.624)	0.118	(0.461)	0.094	(0.355)	0.052	(0.229)
LOG(1+LIQUIDITY)	3.098	(2.402)*	1.999	(3.238)*	1.830	(0.655)*	-1.783	(-0.568)	1.371	(0.904)
LOG(1+VARIANCE)	-1.266	(-2.257)*	-1.548	(-2.71)*	-1.914	(-1.823)**	-1.030	(-1.153)	-1.452	(-2.824)*
LOG(SIZE)	-0.146	(-1.132)	-0.108	(-0.759)	-0.179	(-1.332)	-0.188	(-1.302)	-0.161	(-1.322)
LOG(AGE)	0.017	(0.148)	-0.125	(-0.688)	-0.081	(-0.471)	-0.052	(-0.28)	-0.061	(-0.364)
BTM	0.122	(1.419)	0.056	(0.598)	0.110	(1.086)	0.132	(1.234)	0.148	(1.567)
MOMENTUM	-0.475	(-0.507)	-0.040	(-0.041)	-0.803	(-0.773)	-1.584	(-1.011)	-0.583	(-0.617)
PSI20_DUMMY	0.237	(0.461)	-0.046	(-0.086)	0.363	(0.7)	0.608	(1.065)	0.330	(0.674)

Appendix 6: Ordinary least squares regression (OLS) results of stock characteristics held by mutual funds in bull market periods (continued)

Variable	Regression 11		Regression 12		Regression 13		Regression 14		Regression 15	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	4.246	(1.827)**	3.053	(1.287)	5.228	(2.333)*	3.742	(1.826)**	1.661	(0.732)
LOG(1+PRICE)	0.006	(0.025)	0.135	(0.537)	0.210	(0.847)	-0.171	(-0.701)	-0.157	(-0.577)
LOG(1+LIQUIDITY)	-0.462	(-0.189)	4.078	(2.049)*	2.747	(2.656)*	-0.946	(-0.423)	-1.845	(-0.601)
LOG(1+VARIANCE)	-1.128	(-1.33)*	-2.884	(-2.929)*	-1.236	(-1.374)*	-0.826	(-0.923)	-0.058	(-0.073)
LOG(SIZE)	-0.161	(-1.229)	-0.099	(-0.742)	-0.234	(-1.746)**	-0.120	(-1.06)	-0.008	(-0.058)
LOG(AGE)	-0.085	(-0.46)	-0.094	(-0.722)	-0.078	(-0.459)	-0.002	(-1.22)	-0.002	(-1.037)
BTM	0.104	(1.086)	0.028	(0.295)	0.089	(1.094)	0.069	(0.929)	0.147	(1.95)**
MOMENTUM	-0.504	(-0.405)	2.622	(1.359)	-0.288	(-0.481)	1.207	(0.87)	-0.821	(-1.079)
PSI20_DUMMY	0.461	(0.965)	-0.321	(-0.567)	0.513	(0.993)	0.320	(0.716)	-0.181	(-0.382)

Variable	Regression 16		Regression 17	
	Coefficient	z-Statistic	Coefficient	z-Statistic
C	0.835	(0.406)	3.658	(2.219)*
LOG(1+PRICE)	-0.185	(-0.683)	-0.196	(-0.778)
LOG(1+LIQUIDITY)	-0.759	(-0.247)	0.082	(0.033)
LOG(1+VARIANCE)	-0.320	(-0.422)	-0.287	(-0.389)
LOG(SIZE)	0.018	(0.141)	-0.126	(-1.267)
LOG(AGE)	-0.011	(-0.107)	-0.002	(-1.6)
BTM	0.243	(0.919)	0.149	(2.567)*
MOMENTUM	1.084	(1.614)	2.722	(3.349)*
PSI20_DUMMY	-0.195	(-0.436)	0.138	(0.367)

Appendix 7: Ordinary least squares regression (OLS) results of stock characteristics held by mutual funds in bear market periods.

This table shows 34 OLS regression results, one for each month in bear market periods. We exclude stocks that are not held by any mutual funds and estimate OLS regression to examine the relationship between stock ownership fraction and stock characteristics of interest. Huber-White standard error correction is used to remedy Heteroskedasticity (Huber, 1967; White, 1980). The dependent variable is ownership fraction of stocks. The independent variables are Price, Liquidity, Return variance, size, age, book-to-market ratio, momentum and PSI 20 dummy variable. z-Statistics are provided in parentheses. *, ** denote statistical significance at the 5, 10 percent level, respectively.

Variable	Regression 1		Regression 2		Regression 3		Regression 4		Regression 5	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	10.866	(4.616)*	6.700	(2.416)*	8.495	(3.25)*	7.546	(2.681)*	5.543	(1.815)**
LOG(1+PRICE)	0.033	(0.092)	0.341	(0.757)	0.214	(0.543)	0.462	(1.087)*	0.546	(1.306)*
LOG(1+LIQUIDITY)	5.722	(1.51)	0.187	(0.03)	-1.521	(-0.394)	8.308	(1.911)**	0.848	(0.192)
LOG(1+VARIANCE)	-5.399	(-2.499)*	-1.356	(-0.791)	-1.548	(-1.493)	-4.770	(-2.061)*	-4.289	(-3.23)*
LOG(SIZE)	-0.278	(-2.264)*	-0.211	(-1.49)	-0.242	(-2.016)*	-0.247	(-2.019)*	-0.273	(-1.489)*
LOG(AGE)	-0.910	(-2.402)*	-0.454	(-1.206)*	-0.646	(-1.564)	-0.525	(-1.297)	0.033	(0.146)
BTM	0.657	(2.311)*	0.266	(0.829)	0.338	(1.079)	0.317	(1.156)	0.088	(1.999)*
MOMENTUM	1.261	(1.771)**	-0.716	(-0.724)	1.461	(1.185)	-0.258	(-0.221)	0.118	(0.114)
PSI20_DUMMY	-0.260	(-0.666)	0.300	(0.623)	0.203	(0.464)	0.091	(0.158)	0.001	(0.002)
Variable	Regression 6		Regression 7		Regression 8		Regression 9		Regression 10	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	6.098	(2.325)*	1.210	(0.608)	5.486	(2.242)*	1.966	(0.88)	3.930	(2.1)*
LOG(1+PRICE)	0.699	(2.407)*	0.108	(0.366)	0.400	(1.415)*	0.425	(1.082)*	0.714	(2.115)*
LOG(1+LIQUIDITY)	-3.343	(-0.903)	6.057	(3.783)*	4.921	(0.76)	5.034	(1.152)	8.667	(1.605)
LOG(1+VARIANCE)	-2.969	(-2.728)*	-2.489	(-3.101)*	-3.000	(-3.082)*	-2.462	(-2.076)*	-1.187	(-1.135)
LOG(SIZE)	-0.284	(-1.663)**	0.052	(0.52)	-0.261	(-1.76)	-0.046	(-0.312)	-0.232	(-2.31)*
LOG(AGE)	-0.097	(-0.536)	-0.238	(-0.982)	-0.041	(-0.161)	-0.065	(-0.352)	0.062	(0.371)
BTM	-0.030	(-0.4)	0.334	(2.091)*	0.153	(2.799)*	0.118	(0.667)	0.307	(1.939)**
MOMENTUM	-3.153	(-3.075)*	0.658	(1.322)	-2.431	(-2.237)*	0.173	(0.147)	-2.551	(-1.937)**
PSI20_DUMMY	-0.243	(-0.511)	-1.211	(-2.974)*	0.005	(0.013)	-0.851	(-1.686)**	-0.231	(-0.554)

Appendix 7: Ordinary least squares regression (OLS) results of stock characteristics held by mutual funds in bear market periods (continued)

Variable	Regression 11		Regression 12		Regression 13		Regression 14		Regression 15	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	2.641	(0.895)	5.568	(1.928)	5.429	(1.844)**	5.249	(1.697)**	5.410	(1.93)**
LOG(1+PRICE)	0.521	(1.692)**	0.488	(1.326)*	0.299	(0.823)	0.351	(1.013)	0.418	(1.204)*
LOG(1+LIQUIDITY)	-4.771	(-0.378)	-4.300	(-1.193)	-0.337	(-0.099)	0.900	(0.168)	-3.623	(-0.626)
LOG(1+VARIANCE)	-1.397	(-1.275)	-18.493	(-1.516)	-5.040	(-0.339)	-15.484	(-1.072)	-1.040	(-0.054)
LOG(SIZE)	-0.148	(-1.033)	-0.236	(-1.439)*	-0.233	(-1.384)*	-0.225	(-1.278)*	-0.261	(-1.525)*
LOG(AGE)	0.122	(0.464)	0.004	(0.017)	-0.073	(-0.359)	0.007	(0.029)	0.079	(0.368)
BTM	0.206	(3.562)*	-0.003	(-0.038)	0.066	(1.001)	0.021	(0.337)	-0.020	(-0.234)
MOMENTUM	-1.843	(-1.427)	-1.174	(-1.269)	2.684	(1.766)**	-0.663	(-0.937)	-0.481	(-1.141)
PSI20_DUMMY	-0.175	(-0.328)	-0.187	(-0.429)	0.041	(0.095)	-0.255	(-0.559)	-0.073	(-0.165)
Variable	Regression 16		Regression 17		Regression 18		Regression 19		Regression 20	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	4.207	(1.496)	9.141	(2.951)*	6.240	(2.393)*	4.744	(1.787)**	3.325	(1.37)
LOG(1+PRICE)	0.516	(1.328)*	0.431	(1.214)	0.493	(1.368)	0.600	(1.612)	0.616	(2.813)*
LOG(1+LIQUIDITY)	-7.975	(-1.87)**	-1.811	(-0.7)	-1.103	(-0.362)	-0.070	(-0.066)	-1.548	(-0.418)
LOG(1+VARIANCE)	-3.326	(-2.651)*	-5.052	(-2.192)*	-4.099	(-3.319)*	-4.022	(-3.588)*	-2.247	(-1.862)**
LOG(SIZE)	-0.199	(-1.137)	-0.260	(-1.373)	-0.333	(-1.98)*	-0.244	(-1.487)	-0.120	(-0.702)
LOG(AGE)	0.052	(0.24)	-0.723	(-1.511)	0.086	(0.451)	0.057	(0.248)	-0.182	(-0.846)
BTM	0.105	(3.823)*	0.139	(3.768)*	0.080	(2.162)*	0.107	(3.782)*	0.089	(1.337)
MOMENTUM	-0.728	(-1.486)	1.206	(1.006)	0.887	(1.602)	0.476	(1.04)	-2.742	(-2.997)*
PSI20_DUMMY	-0.184	(-0.408)	0.051	(0.09)	0.309	(0.702)	-0.090	(-0.208)	-0.440	(-0.867)

Appendix 7: Ordinary least squares regression (OLS) results of stock characteristics held by mutual funds in bear market periods (continued)

Variable	Regression 21		Regression 22		Regression 23		Regression 24		Regression 25	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	5.005	(1.501)	2.459	(0.843)	2.333	(1.381)	5.217	(1.655)	4.636	(1.992)*
LOG(1+PRICE)	0.476	(1.341)	0.469	(1.502)	0.215	(0.752)	0.429	(1.163)	0.333	(1.092)
LOG(1+LIQUIDITY)	-1.371	(-0.283)	-1.713	(-0.361)	4.577	(1.155)	-2.934	(-0.477)	1.478	(0.386)
LOG(1+VARIANCE)	-3.774	(-2.428)*	-5.569	(-3.14)*	-2.664	(-3.133)*	-2.625	(-2.486)*	-1.045	(-0.776)
LOG(SIZE)	-0.245	(-1.196)	-0.049	(-0.268)	-0.045	(-0.39)	-0.243	(-1.239)	-0.237	(-1.769)
LOG(AGE)	0.043	(0.188)	-0.185	(-0.772)	-0.156	(-1.047)	0.046	(0.178)	0.104	(0.542)
BTM	0.159	(2.736)*	0.178	(2.513)*	0.422	(2.169)*	0.054	(2.128)*	0.203	(0.941)
MOMENTUM	-0.181	(-0.144)	1.668	(1.516)	1.065	(2.15)*	-1.572	(-1.688)	0.283	(0.135)
PSI20_DUMMY	-0.051	(-0.097)	-0.684	(-1.257)	-0.780	(-1.579)	-0.184	(-0.417)	0.029	(0.07)

Variable	Regression 26		Regression 27		Regression 28		Regression 29		Regression 30	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	2.635	(1.339)	3.925	(1.523)	5.629	(2.773)*	3.267	(1.505)	1.306	(0.823)
LOG(1+PRICE)	0.162	(0.488)	0.343	(0.881)	0.417	(1.323)	0.178	(0.559)	0.157	(0.521)
LOG(1+LIQUIDITY)	2.443	(0.889)	0.124	(0.117)	1.685	(0.565)	6.679	(1.385)	4.441	(1.346)
LOG(1+VARIANCE)	-0.302	(-0.29)	-3.204	(-2.651)*	-3.916	(-3.459)*	-2.817	(-3.009)*	-2.524	(-2.793)*
LOG(SIZE)	-0.113	(-0.871)	-0.136	(-0.854)	-0.252	(-1.877)**	-0.114	(-0.862)	-0.019	(-0.194)
LOG(AGE)	0.095	(0.993)	-0.097	(-0.445)	-0.020	(-0.093)	-0.002	(-1.227)	-0.001	(-0.417)
BTM	0.097	(0.622)	0.059	(2.11)*	0.091	(4.809)*	0.485	(2.927)*	0.203	(1.45)
MOMENTUM	0.625	(0.857)	0.899	(1.09)	0.755	(1.433)	-0.409	(-0.599)	0.955	(0.893)
PSI20_DUMMY	-0.390	(-0.748)	-0.398	(-0.909)	-0.163	(-0.47)	-0.861	(-1.849)**	-0.808	(-1.494)

Appendix 7: Ordinary least squares regression (OLS) results of stock characteristics held by mutual funds in bear market periods (continued)

Variable	Regression 31		Regression 32		Regression 33		Regression 34	
	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic	Coefficient	z-Statistic
C	0.721	(0.408)	1.838	(0.924)	1.363	(0.762)	1.527	(0.867)
LOG(1+PRICE)	0.219	(0.745)	0.150	(0.459)	0.167	(0.448)	0.317	(0.774)
LOG(1+LIQUIDITY)	16.810	(2.597)*	9.105	(1.419)	4.823	(1.24)	5.945	(0.909)
LOG(1+VARIANCE)	-2.591	(-3.343)*	-0.367	(-0.332)	-2.653	(-2.593)*	-2.925	(-2.942)*
LOG(SIZE)	-0.014	(-0.127)	-0.083	(-0.641)	-0.019	(-0.163)	-0.045	(-0.38)
LOG(AGE)	0.046	(0.461)	0.118	(1.28)	0.000	(-0.186)	0.000	(-0.255)
BTM	0.121	(1.35)	0.205	(1.736)**	0.183	(1.537)	0.196	(1.721)**
MOMENTUM	0.319	(0.386)	1.198	(1.282)	0.657	(0.443)	-0.698	(-0.675)
PSI20_DUMMY	-0.906	(-1.797)**	-0.775	(-1.297)	-0.753	(-1.381)	-0.701	(-1.438)

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